



## SEQUENCE LISTING

<110> Ehrhardt, Thomas  
Lerchl, Jens  
Nigel, Marc Stitt  
Zenner, Rita

<120> Plant dihydroorotate

<130> 0050/50716

<140> US 10/070,277  
<141> 2002-03-06

<150> PCT/EP00/08581  
<151> 2000-09-02

<160> 9

<170> Microsoft Word 2003

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<211> 1271  
<212> DNA  
<213> Solanum tuberosum

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<222> (9)..(1046)

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Leu Arg Asp Gly Asp Val Leu Lys Ala Val Val Ser His Ser Ala His  
15 20 25 30

cac ttt ggg agg gca ata gtc atg cca aat ttg aag cct cct atc act 146  
His Phe Gly Arg Ala Ile Val Met Pro Asn Leu Lys Pro Pro Ile Thr  
35 40 45

acc act gct gct gta gca tac cgg gag gcg ata ttg aaa tct tta 194  
Thr Thr Ala Ala Ala Val Ala Tyr Arg Glu Ala Ile Leu Lys Ser Leu  
50 55 60

cct gtt gat agt gat ttc aac cct ctt atg aca ctt tat ttg aca gat 242  
Pro Val Asp Ser Asp Phe Asn Pro Leu Met Thr Leu Tyr Leu Thr Asp  
65 70 75

aca acc agt cct atg gaa atc aaa cta gca aga gag agc cag gtc gta 290  
Thr Thr Ser Pro Met Glu Ile Lys Leu Ala Arg Glu Ser Gln Val Val  
80 85 90

ttt ggg gtg aag ttg tac cct gct ggt gcc acg aca aat tct caa gat		338
Phe Gly Val Lys Leu Tyr Pro Ala Gly Ala Thr Thr Asn Ser Gln Asp		
95	100	105
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gga gtg act gat ctt ttc ggg aag tgt tta cca gtt cta caa gaa atg		386
Gly Val Thr Asp Leu Phe Gly Lys Cys Leu Pro Val Leu Gln Glu Met		
115	120	125
gtt gag cat aat atg cct ctg ctg gtt cat gga gag gtt act aat cct		434
Val Glu His Asn Met Pro Leu Leu Val His Gly Glu Val Thr Asn Pro		
130	135	140
gag gtt gac atg ttt gat aga gaa aag gta ttc att gaa acg gtt cta		482
Glu Val Asp Met Phe Asp Arg Glu Lys Val Phe Ile Glu Thr Val Leu		
145	150	155
aga ccg ttg gtg cag aaa ttt cca caa ttg aag gtc gtg atg gag cat		530
Arg Pro Leu Val Gln Lys Phe Pro Gln Leu Lys Val Val Met Glu His		
160	165	170
gtt acc acc att gat gct gtt aag ttt gtt gaa tct tgc act gaa gga		578
Val Thr Thr Ile Asp Ala Val Lys Phe Val Glu Ser Cys Thr Glu Gly		
175	180	185
190		
ttt gtt gca gca act gtc acc cca caa cat ctt gtt ttg aac agg aat		626
Phe Val Ala Ala Thr Val Thr Pro Gln His Leu Val Leu Asn Arg Asn		
195	200	205
tct ctc ttc caa ggg ggc tta caa ccg cat aat tac tgc ctt cca gtc		674
Ser Leu Phe Gln Gly Gly Leu Gln Pro His Asn Tyr Cys Leu Pro Val		
210	215	220
ctc aaa aga gag atc cac agg gag gca ctt gtg tca gct gta aca agt		722
Leu Lys Arg Glu Ile His Arg Glu Ala Leu Val Ser Ala Val Thr Ser		
225	230	235
gga agt aaa aga ttt ttt ctt ggg act gat agt gct cct cat gat aga		770
Gly Ser Lys Arg Phe Phe Leu Gly Thr Asp Ser Ala Pro His Asp Arg		
240	245	250
cga aga aaa gag tgt tct tgt gga tgt gct ggt att tac aat gca cct		818
Arg Arg Lys Glu Cys Ser Cys Gly Cys Ala Gly Ile Tyr Asn Ala Pro		
255	260	265
270		
gta gcc ttg tca gta tat gcg aag gtg ttt gaa aag gaa aat gca ctc		866
Val Ala Leu Ser Val Tyr Ala Lys Val Phe Glu Lys Glu Asn Ala Leu		
275	280	285
gac aag ctt gaa gca ttc act agc ttc aat gga cca gat ttt tat ggg		914
Asp Lys Leu Glu Ala Phe Thr Ser Phe Asn Gly Pro Asp Phe Tyr Gly		
290	295	300
ctt cct agg aac aac tca aag att aag ttg agt aag acg cca tgg aag		962
Leu Pro Arg Asn Asn Ser Lys Ile Lys Leu Ser Lys Thr Pro Trp Lys		
305	310	315
gta ccc gaa tcc ttt tct tat gca tca gga gat att att ccc atg ttt		1010
Val Pro Glu Ser Phe Ser Tyr Ala Ser Gly Asp Ile Ile Pro Met Phe		

320

325

330

gct ggt gaa atg ctc gac tgg ttg ccg gct cct ctc tgagaatcat	1056
Ala Gly Glu Met Leu Asp Trp Leu Pro Ala Pro Leu	
335	340
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ttgtcattct tgtactgtaa tattgtgatt caaccaaaga tatagactgt aggtgtatca	1116
tctttctt catgttgatt agatattatc acgatgataa tattccttcgactaataat	1176
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<211> 346  
<212> PRT  
<213> Solanum tuberosum

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Gly Arg Ala Ile Val Met Pro Asn Leu Lys Pro Pro Ile Thr Thr Thr			
35	40	45	

Ala Ala Ala Val Ala Tyr Arg Glu Ala Ile Leu Lys Ser Leu Pro Val			
50	55	60	

Asp Ser Asp Phe Asn Pro Leu Met Thr Leu Tyr Leu Thr Asp Thr Thr			
65	70	75	80

Ser Pro Met Glu Ile Lys Leu Ala Arg Glu Ser Gln Val Val Phe Gly			
85	90	95	

Val Lys Leu Tyr Pro Ala Gly Ala Thr Thr Asn Ser Gln Asp Gly Val			
100	105	110	

Thr Asp Leu Phe Gly Lys Cys Leu Pro Val Leu Gln Glu Met Val Glu			
115	120	125	

His Asn Met Pro Leu Leu Val His Gly Glu Val Thr Asn Pro Glu Val			
130	135	140	

Asp Met Phe Asp Arg Glu Lys Val Phe Ile Glu Thr Val Leu Arg Pro			
145	150	155	160

Leu Val Gln Lys Phe Pro Gln Leu Lys Val Val Met Glu His Val Thr			
165	170	175	

Thr Ile Asp Ala Val Lys Phe Val Glu Ser Cys Thr Glu Gly Phe Val			
180	185	190	

Ala Ala Thr Val Thr Pro Gln His Leu Val Leu Asn Arg Asn Ser Leu  
195 200 205

Phe Gln Gly Gly Leu Gln Pro His Asn Tyr Cys Leu Pro Val Leu Lys  
210 215 220

Arg Glu Ile His Arg Glu Ala Leu Val Ser Ala Val Thr Ser Gly Ser  
225 230 235 240

Lys Arg Phe Phe Leu Gly Thr Asp Ser Ala Pro His Asp Arg Arg Arg  
245 250 255

Lys Glu Cys Ser Cys Gly Cys Ala Gly Ile Tyr Asn Ala Pro Val Ala  
260 265 270

Leu Ser Val Tyr Ala Lys Val Phe Glu Lys Glu Asn Ala Leu Asp Lys  
275 280 285

Leu Glu Ala Phe Thr Ser Phe Asn Gly Pro Asp Phe Tyr Gly Leu Pro  
290 295 300

Arg Asn Asn Ser Lys Ile Lys Leu Ser Lys Thr Pro Trp Lys Val Pro  
305 310 315 320

Glu Ser Phe Ser Tyr Ala Ser Gly Asp Ile Ile Pro Met Phe Ala Gly  
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Glu Met Leu Asp Trp Leu Pro Ala Pro Leu  
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<210> 3

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<212> DNA

<213> Nicotiana tabacum

<220>

<221> CDS

<222> (305)..(1678)

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ttgtacactc ccattgtcgc ttccagttt gtgccccaaa taacctttc agtcatttgt 180

atcttagcat caacaacagt tgctgtctct cttttgttcg tccaataatac tgagcatttt 240

ttgagtagta atttgaaggg tttattcagt tgttaaatat ttgattttt 300

gaaa atg aga caa agg gtt gga ttt gca ttg att aga gaa agc ttg tat 349

Met Arg Gln Arg Val Gly Phe Ala Leu Ile Arg Glu Ser Leu Tyr

1

5

10

15

cgt aag cta aaa cca agc tct gtt ccc aga cat tat tgc act tct tct 397  
Arg Lys Leu Lys Pro Ser Ser Val Pro Arg His Tyr Cys Thr Ser Ser

20	25	30	
tca gct aat gtt cct cct att cct cca cct aag att cct cat tct tct Ser Ala Asn Val Pro Pro Ile Pro Pro Pro Lys Ile Pro His Ser Ser			445
35	40	45	
aaa aag gga agg ttg ttt aca gga gcc act att ggt cta cta ata gct Lys Lys Gly Arg Leu Phe Thr Gly Ala Thr Ile Gly Leu Leu Ile Ala			493
50	55	60	
ggg gga gct tat gca agt acg gtt gat gag gcc acc ttc tgt ggc tgg Gly Gly Ala Tyr Ala Ser Thr Val Asp Glu Ala Thr Phe Cys Gly Trp			541
65	70	75	
cta ttc tca gca aca aaa cta gta aat ccg ttc ttt gca ttt ctg gat Leu Phe Ser Ala Thr Lys Leu Val Asn Pro Phe Ala Phe Leu Asp			589
80	85	90	95
cca gag gtt gct cac aaa ctg gcg gtc tct gct gca gcc cga gga tgg Pro Glu Val Ala His Lys Leu Ala Val Ser Ala Ala Ala Arg Gly Trp			637
100	105	110	
gtt cca agg gag aag agg cca gat cct cct ata ttg ggc ctt gat gtg Val Pro Arg Glu Lys Arg Pro Asp Pro Pro Ile Leu Gly Leu Asp Val			685
115	120	125	
tgg gga aga agg ttc tca aat cct gtt ggt ctt gct gct ggt ttt gac Trp Gly Arg Arg Phe Ser Asn Pro Val Gly Leu Ala Ala Gly Phe Asp			733
130	135	140	
aag aat gct gag gct gtt gaa gga ttg ctt gga tta ggt ttt ggc ttt Lys Asn Ala Glu Ala Val Glu Gly Leu Leu Gly Leu Gly Phe Gly Phe			781
145	150	155	
gtt gag gtt ggc tca gta act ccc att cca cag gaa ggc aac cca aaa Val Glu Val Gly Ser Val Thr Pro Ile Pro Gln Glu Gly Asn Pro Lys			829
160	165	170	175
cca cgt ata ttt agg ttg cca aat gaa ggt gct ata ata aat agg tgt Pro Arg Ile Phe Arg Leu Pro Asn Glu Gly Ala Ile Ile Asn Arg Cys			877
180	185	190	
ggc ttc aat agt gaa gga atc gtt gtg gtt gcc aaa cga ttg ggt gct Gly Phe Asn Ser Glu Gly Ile Val Val Ala Lys Arg Leu Gly Ala			925
195	200	205	
cag cat ggt aag aga aag ttg gaa aca tct agt act tca tct cca gct Gln His Gly Lys Arg Lys Leu Glu Thr Ser Ser Thr Ser Pro Ala			973
210	215	220	
gga gat gaa gtc aag cat gga ggg aaa gct ggt cct ggt att ctt ggt Gly Asp Glu Val Lys His Gly Gly Lys Ala Gly Pro Gly Ile Leu Gly			1021
225	230	235	
gtt aac ctt gga aag aat aaa aca agt gaa gac gct gca gca gat tat Val Asn Leu Gly Lys Asn Lys Thr Ser Glu Asp Ala Ala Asp Tyr			1069
240	245	250	255

gtg caa gga gtc cat aca tta tct cag tat gct gac tac ttg gta att		1117	
Val Gln Gly Val His Thr Leu Ser Gln Tyr Ala Asp Tyr Leu Val Ile			
260	265	270	
aat atc tca tcc cca aat act cca gga cta cgc cag ctt cag gga aga		1165	
Asn Ile Ser Ser Pro Asn Thr Pro Gly Leu Arg Gln Leu Gln Gly Arg			
275	280	285	
aag cag ttg aag gat ctt gtg aag aag gtt caa gca gct cgt gat gaa		1213	
Lys Gln Leu Lys Asp Leu Val Lys Lys Val Gln Ala Ala Arg Asp Glu			
290	295	300	
atg cag tgg ggt gag gaa gga cct ccg cct tta ctt gtg aaa att gct		1261	
Met Gln Trp Gly Glu Gly Pro Pro Leu Leu Val Lys Ile Ala			
305	310	315	
cca gat ttg tct aaa caa gat ctt gaa gat att gca gtg gtg gct gtt		1309	
Pro Asp Leu Ser Lys Gln Asp Leu Glu Asp Ile Ala Val Val Ala Val			
320	325	330	335
gct ctt cgt gtg gat gga ctg att ata tca aat act act gtc caa aga		1357	
Ala Leu Arg Val Asp Gly Leu Ile Ile Ser Asn Thr Thr Val Gln Arg			
340	345	350	
cca gat tcc ata agt caa aac cct gtg gct caa gag gct ggt ggc ttg		1405	
Pro Asp Ser Ile Ser Gln Asn Pro Val Ala Gln Glu Ala Gly Gly Leu			
355	360	365	
agt ggg aag cca ctc ttt gac atg tca aca aat ata ctg aag gag atg		1453	
Ser Gly Lys Pro Leu Phe Asp Met Ser Thr Asn Ile Leu Lys Glu Met			
370	375	380	
tac gtt ctg act aag gga agg att cct ctg att ggc act ggg ggt att		1501	
Tyr Val Leu Thr Lys Gly Arg Ile Pro Leu Ile Gly Thr Gly Gly Ile			
385	390	395	
agc agt ggc gag gat gct tac aag aaa att cga gct ggt gcc act ctt		1549	
Ser Ser Gly Glu Asp Ala Tyr Lys Lys Ile Arg Ala Gly Ala Thr Leu			
400	405	410	415
gtt cag ctt tat aca gca ttt gca tat gga ggc cct gca ctt atc ccc		1597	
Val Gln Leu Tyr Thr Ala Phe Ala Tyr Gly Gly Pro Ala Leu Ile Pro			
420	425	430	
gat ata aag gat gaa ctt gct cgt tgc tta gaa aag gat ggt tat aag		1645	
Asp Ile Lys Asp Glu Leu Ala Arg Cys Leu Glu Lys Asp Gly Tyr Lys			
435	440	445	
tca atc agt gag gct gtt gga gca gac tgc aga tagtagtagt tgatatacta		1698	
Ser Ile Ser Glu Ala Val Gly Ala Asp Cys Arg			
450	455		
aaccagtctt ttgagttga gggcgagac acattttgc cacttataat aaatgatata		1758	
tttatggttt cctccatgt ggcgtcatat cattgcttc gtaatttgat atgtcttccc		1818	
aaattttagc tgtttaggaa ttactcgtgg caggtgaccc gtatTTTGA aatgtatat		1878	
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aaaaaaaaaaa aaaaaaaaaaga attc

1962

<210> 4

<211> 458

<212> PRT

<213> Nicotiana tabacum

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20 25 30

Ala Asn Val Pro Pro Ile Pro Pro Pro Lys Ile Pro His Ser Ser Lys  
35 40 45

Lys Gly Arg Leu Phe Thr Gly Ala Thr Ile Gly Leu Leu Ile Ala Gly  
50 55 60

Gly Ala Tyr Ala Ser Thr Val Asp Glu Ala Thr Phe Cys Gly Trp Leu  
65 70 75 80

Phe Ser Ala Thr Lys Leu Val Asn Pro Phe Phe Ala Phe Leu Asp Pro  
85 90 95

Glu Val Ala His Lys Leu Ala Val Ser Ala Ala Ala Arg Gly Trp Val  
100 105 110

Pro Arg Glu Lys Arg Pro Asp Pro Pro Ile Leu Gly Leu Asp Val Trp  
115 120 125

Gly Arg Arg Phe Ser Asn Pro Val Gly Leu Ala Ala Gly Phe Asp Lys  
130 135 140

Asn Ala Glu Ala Val Glu Gly Leu Leu Gly Leu Gly Phe Gly Phe Val  
145 150 155 160

Glu Val Gly Ser Val Thr Pro Ile Pro Gln Glu Gly Asn Pro Lys Pro  
165 170 175

Arg Ile Phe Arg Leu Pro Asn Glu Gly Ala Ile Ile Asn Arg Cys Gly  
180 185 190

Phe Asn Ser Glu Gly Ile Val Val Val Ala Lys Arg Leu Gly Ala Gln  
195 200 205

His Gly Lys Arg Lys Leu Glu Thr Ser Ser Thr Ser Ser Pro Ala Gly  
210 215 220

Asp Glu Val Lys His Gly Lys Ala Gly Pro Gly Ile Leu Gly Val  
225 230 235 240

Asn Leu Gly Lys Asn Lys Thr Ser Glu Asp Ala Ala Ala Asp Tyr Val  
245 250 255

Gln Gly Val His Thr Leu Ser Gln Tyr Ala Asp Tyr Leu Val Ile Asn  
260 265 270

Ile Ser Ser Pro Asn Thr Pro Gly Leu Arg Gln Leu Gln Gly Arg Lys  
275 280 285

Gln Leu Lys Asp Leu Val Lys Lys Val Gln Ala Ala Arg Asp Glu Met  
290 295 300

Gln Trp Gly Glu Glu Gly Pro Pro Pro Leu Leu Val Lys Ile Ala Pro  
305 310 315 320

Asp Leu Ser Lys Gln Asp Leu Glu Asp Ile Ala Val Val Ala Val Ala  
325 330 335

Leu Arg Val Asp Gly Leu Ile Ile Ser Asn Thr Thr Val Gln Arg Pro  
340 345 350

Asp Ser Ile Ser Gln Asn Pro Val Ala Gln Glu Ala Gly Gly Leu Ser  
355 360 365

Gly Lys Pro Leu Phe Asp Met Ser Thr Asn Ile Leu Lys Glu Met Tyr  
370 375 380

Val Leu Thr Lys Gly Arg Ile Pro Leu Ile Gly Thr Gly Gly Ile Ser  
385 390 395 400

Ser Gly Glu Asp Ala Tyr Lys Lys Ile Arg Ala Gly Ala Thr Leu Val  
405 410 415

Gln Leu Tyr Thr Ala Phe Ala Tyr Gly Gly Pro Ala Leu Ile Pro Asp  
420 425 430

Ile Lys Asp Glu Leu Ala Arg Cys Leu Glu Lys Asp Gly Tyr Lys Ser  
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Ile Ser Glu Ala Val Gly Ala Asp Cys Arg  
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<212> PRT

<213> Artificial Sequence

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<212> DNA

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